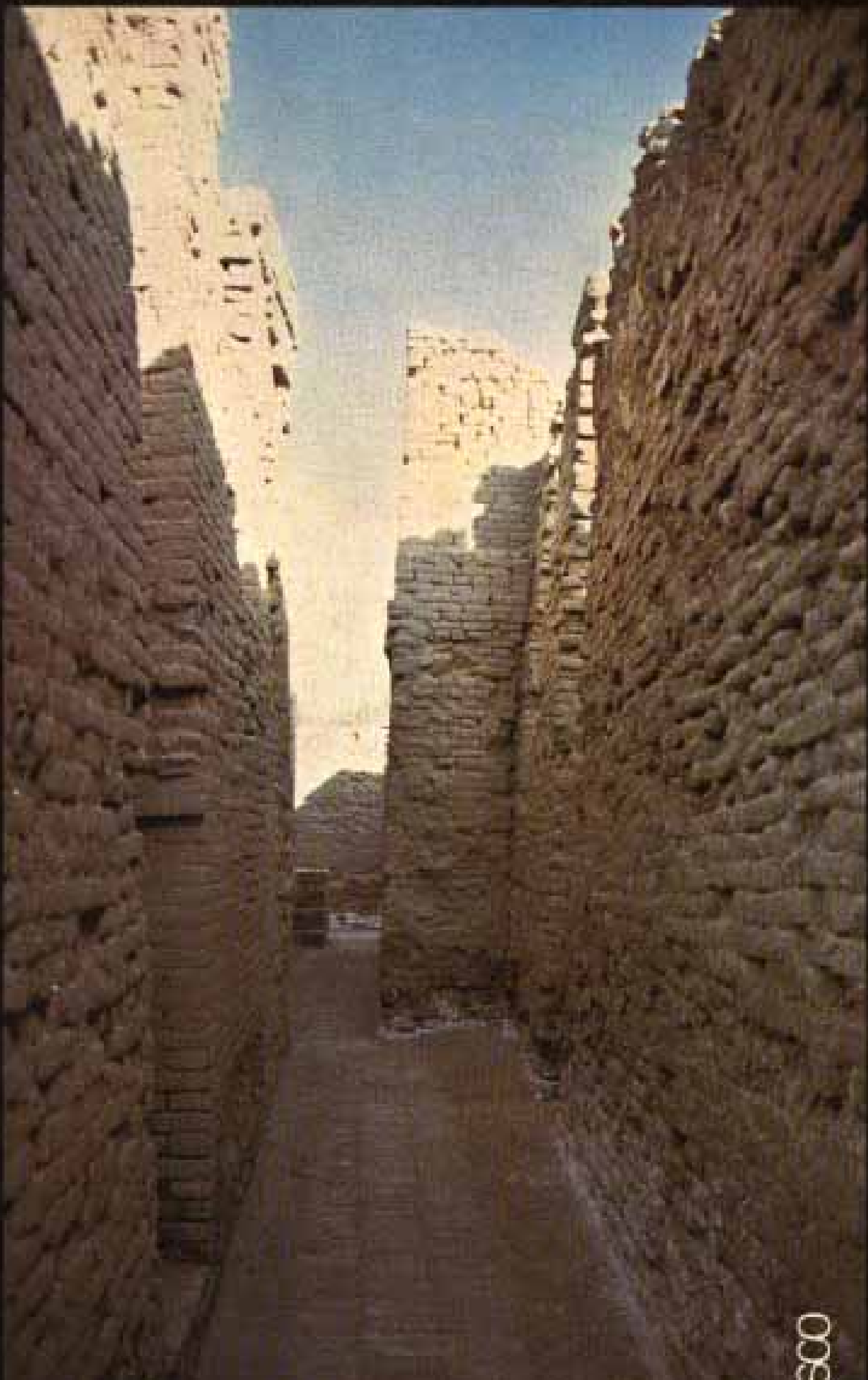
MOENJODARO a 5,000-year-old legacy

khurshid hasan shaikh and syed m. ashfaque



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Cover.
A lane in the lower city of Moenjodaro.
(Photo: Unesco/McKenzie.)

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Preface

Moenjodaro in the province of Sind, Pakistan, is one of the main centres of the culture that flourished in the Indus Valley 5,000 years ago, extending its influence over an enormous region not only in Pakistan but also in the adjoining areas. It provides the earliest instance of an exemplary form of town planning and community organization and is an extraordinary example of a civilization based on an agrarian economy combined with an urban political structure.

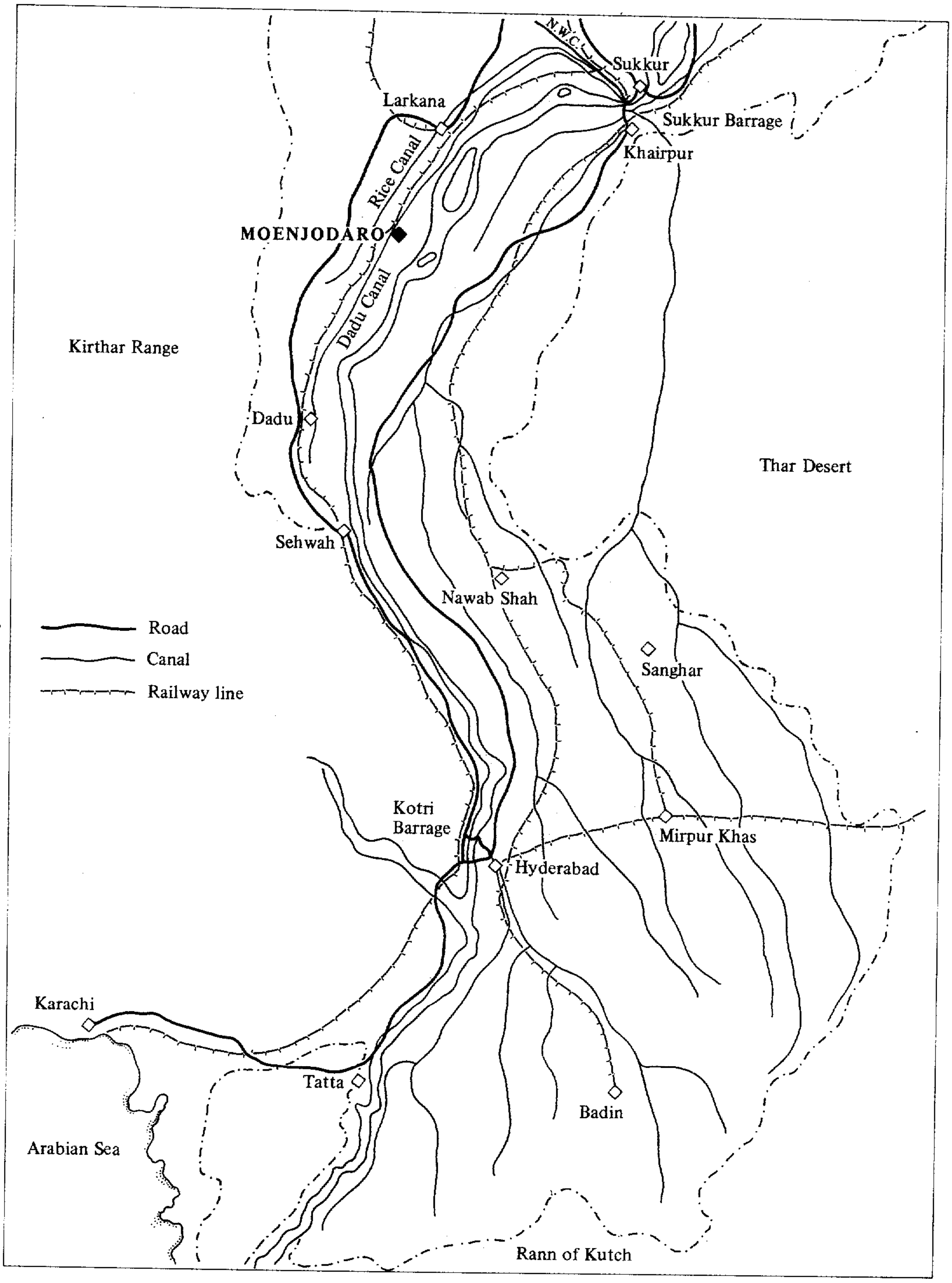
Due to ravages of time. Moenjodaro is today in danger of total destruction. Apart from the threat of floods by the nearby River Indus. the buildings are being gradually eroded by the capillary rise of saline groundwater. the level of which is considerably higher since the construction of the Sukkur Dam, feeding a number of irrigation canals in the vicinity.

The Government of Pakistan, conscious of the need to preserve and protect this heritage of mankind, has called upon Unesco, and in turn Unesco is mobilizing international support to aid in carrying out a programme of conservation.

This book. written by Khurshid Hasan Shaikh and Syed M. Ashfaque, both of the Department of Archaeology and Museums in Pakistan, is part of the Unesco campaign to safeguard Moenjodaro and to draw the attention of the international community to the dangers threatening it

The authors are responsible for the choice and the presentation of the facts contained in this book and for the opinions expressed therein, which are not necessarily those of Unesco and do not commit the Organization.

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Introduction

Moenjodaro is located about 400 kilometres north of Karachi on the right bank of the Indus in the Province of Sind in Pakistan. It commands a high position in world archaeology, rivalling that of ancient Babylon, and possibly even exceeding it in its revelation of some aspects of an extinct society's human ingenuity in organizing living for collective welfare. For any intellectual visitor to Pakistan. Moenjodaro occupies one of the foremost places on his itinerary. while for students of the cultural history of mankind, a visit to Moenjodaro is a pilgrimage to the ancient ruins sanctified by the passing millennia, and a homage to the devoted labours of the distinguished excavators of the present century.

Discovery

The remarkable discovery of Moenjodaro in 1922 was at first nothing more than the result of routine explorations by the Archaeological Survey of British India, recording twin mounds. one large and the other small, in the District of Larkana about 12 kilometres east of the small town of Dokri. Of the two mounds surrounded by flat marshy ground of the Indus flood plains. the one closer to the river was lower. standing 5 to 7 metres above the general plain level and occupying an area approximately 450,000 square metres.

The smaller mound. measuring about 400 metres from north to south. and 200 metres from east to west. lay to the west of the larger mound and was separated from it by a strip of low ground about 200 metres wide. Its small size of 80,000 square metres was. however. compensated for by its higher relief, nearly 22 metres from the level of the surrounding plain. On its top there was a Buddhist stupa of the Kushan period (second century AD).

. Location map : Moenjodaro was built near a source of water-the water which now threatens its remains.

A profusion of baked bricks visible in the eroded gullies and outcroppings of the buried walls on both the mounds. with surface sprinkling of potsherds of apparently distinct character. and some pieces of steatite seals with strange inscriptions and animal figures. recalled to mind the observations of General Cunningham on the antiquity of culture at the site of Harappa. The site, which he first visited in 1856. lay nearly 800 kilometres away to the north-east in the Sahiwal District of the Punjab. The similarity of cultural deposits at the two places situated such a long distance apart raised intriguing questions that necessitated thorough investigations.

The excavations at Moenjodaro started in 1922 gained momentum under the direction of Sir John Marshall, then Director General of the Archaeological Survey. culminating in the publication of his report (in three volumes). Mohenjodaro *and the Indus Civilization.* in 1931. The work was continued up to 1936 by Ernest Mackay. who published his *Further Excavations at Mohenjo-Daro* (in two volumes) in 1938. These publications aroused great excitement in the scholarly world. What had appeared in the early days to be a localized extinct culture at Harappa was in fact an extensive civilization spread over the whole expanse of alluvium plains of the River lndus and its large tributaries.

A general view of Moenjodaro from the Great Bath.

A typological study of the cultural assemblage at Harappa, Moenjodaro and some other places. such as Chanhudaro in Sind, suggested an age from 2500 to 1500 B.C. This was a tentative estimate only of the mature phase of the civilization with no definite clues to its time of origin. and yet 2500 years B.C. corresponded to the Classical Sumerian period in Mesopotamia ! This was certainly a tremendous leap backwards in the antiquity of civilization in the South-Asian Subcontinent. which before the large-scale excavations at Moenjodaro was thought to have a confirmed limit only as early as the third century B.C., or an unconfirmed limit going back at best to the twelfth century B.C.. as estimated by the scholars of the Vedic traditions.

Geographical extent

The last three decades of field researches in both Pakistan and India show that the mature phase of the Indus Valley Civilization spread over a much larger area than was known in 1922. It seems to have filled all the space shown as a splash of green on any physiographic map of the South-Asian Subcontinent, lying between the Suleiman and Kirthar ranges right from the Arabian seaboard to the Himalayan foothills. This area. much larger than

Building remains D showing salt-affected walls.





the combined size of Mesopotamian and Nilotic civilizations, may be taken as a large ellipse with its major axis oriented along the River Indus and the sites of Harappa and Moenjodaro forming the two foci. Though the axial core of the area lies entirely within Pakistan. its eastern flanks extending across the border show two very interesting Harappan settlements-that of Kalibangan in eastern Punjab. and that of Lothal in Surashtra. near the head of the Gulf of Cambay.

A notable feature in the geographical extension of the Mature Harappan culture is the string of trading outposts found along the coast of Makran. Three of these. at Balakot, Sokhta Koh and Sutkagendor, have been studied in detail during the last two decades of archaeological researches in Pakistan. The significance of these trading outposts is that they provide undeniable evidence of the commercial and cultural contacts between Mesopotamia and the Indus basin at the height of their ancient civilizations in the Chalcolithic Age. lndus seals are known to have been found at various Sumerian sites. especially in the cultural deposits of the Akkadian times (2300 to 2000 B.C. or a little later). and there are also traces of the characteristic Harappan pottery at archaeological sites in Bahrein and some of the coastal points of the Gulf. The Assyriologists point to certain Mesopotamian tablets with economic texts. mentioning items imported from Melluha, a name likely to be from regions situated in the east, and most probably the vast area of the Indus Valley Civilization.

Roots of the Indus Valley Civilization

Much as in determining the geographical extent, the archaeological probe in Pakistan has been directed towards measuring the time of origin of the Indus Valley Civilization. The site of Kot Diji, in the Khairpur District in Sind. has yielded characteristic ceramics of a definitely earlier phase of Harappan culture. The Kot Dijian. or Early Harappan culture. has been struck at Amri with some little variations. at Sarai Khola near Taxila, Jalilpur in the Multan District. Rahman Dheri and Lewan sites in the Bannu basin, and at Mehrgarh in Baluchistan south and east of the Suleiman and Kirthar ranges. Thus, the early stage of the Indus Valley Civilization is visible at places distributed over all the provinces of the country.

Of the Early Harappan sites. the recent discoveries at Mehrgarh in particular show almost an unbroken sequence of cultural

evolution at least from the sixth millennium B.C. to the beginning of the Mature Harappan culture.

It appears that towards the close of the Neolithic Age in ancient Pakistan, when there was increasing dependence on peasant economy. the widely scattered communities settled down in various small river valleys and at other fertile or favourable spots. This nascent society in divided pockets had its own local peculiarities of material culture. and even showed occasional foreign intrusions in some cases. But, generally speaking. the communities had the same broad cultural traits, as some levelling mechanism of interdependence must have been at work to meet their material needs.

Yet, it looks puzzling that. within a short span of a few centuries separating the Early from the Mature phase of the Harappan culture. this nascent society should have assumed the status of a cohesive civilization and with all the stamps of uniformity. and spread over such a large area as the entire Indus basin. Though not born Minerva-like. fully grown. the Indus Valley Civilization springs to adolescence with surprising celerity. in spite of its early phase visible in the Kot Dijian levels of the various archaeological sites.

Economic prosperity and material culture

A probable solution to this paradox may be sought in the economic phenomenon called a ‘Rush’. Modern history has seen a ‘Rice Rush’. a ‘Gold Rush’ and a ‘Tobacco Rush’. More recently. the Sugar-cane Rush’ necessitated the mass import of labour from abroad and now the ‘Petroleum Rush’ in the Gulf states has absorbed an enormous number of technically competent workers from overseas. with a resultant pace of progress in the host countries but also creating quite a few problems.

An ‘Economic Rush’ can better be understood from the preceding analogies than defined in a precise way. It is a complex phenomenon that has both good and bad effects in disturbing the balance of cultural inertia. The leap of the Early Harappan culture to its mature phase of the Indus Valley Civilization may be attributed to the first such economic phenomenon ever experienced in human history. The commodity vitally involved in precipitating this change was most probably cotton.

As cotton seeds have been found in the organic matter collected from deposits of the sixth millennium B.C. at Mehrgarh. and these are indeed the earliest samples found so far anywhere in the world. there is ample reason to believe that this plant was native to this part of the Indus basin, and was possibly ‘domesticated’ in those early millennia for its fibres. The utility of the fibre once discovered. its cultivation might have progressively increased. The produce, either in raw form or in spun yarns, probably found its way to the neighbouring areas, and among them to the fairly advanced communities of Iran and Mesopotamia.

The attractions of cotton yam, no doubt, must have been spontaneous. and the commercial demands colossal. However, the small. loosely knit communities of the Kot Dijian period growing their cotton plants in small plots in the backyards of their houses,

were unable to supply all the demands pouring in from abroad. Something had to be done quickly. It was not simply a question of calling the whole village together and telling the people to grow more cotton. It was a social and cultural revolution for massive agricultural activities. something to be achieved by collective goodwill and a proper division of labour. It also required vast stretches of fertile land. not the small coves and fertile patches of the Gomal or Bolan rivers. It induced the small farming communities to colonize the vast 'prairie' lands along the Indus and the Hakra and other rivers in between. The small, scattered cultural pockets of the Kot Dijian population moved towards the axial belt of the ellipse of the Indus basin, living together. intermarrying, and merging their identities in a new cultural milieu, more advanced, refined, tolerant and absorbing. Of course. the efforts of a few growing seasons of cotton were not sufficient to achieve a full-grown civilization. It must have taken several centuries finally to succeed, and in the process to undergo a transformation from good intentions to the discipline of the Indus Valley Civilization.

This oversimplified but graphic sketch of the first 'Cotton Rush' may lie at the root of the rise of a mighty cotton empire, which the Mesopotamians have called 'Melluha' in their tablets of economic texts. The inhabitants of this empire growing richer each year sought for the better comforts that their wealth could procure.

The expanding business of cotton trading congregated in some favourable spots, which gradually grew into mighty cities with residential houses, business centres, dyer's quarters. smithies, carpentery shops. paved boulevards. covered drainage. water supplies-and most important of all-an administrative complex with its treasury. courts. exchequer's office, governor's residence. priest's cloisters, etc.

Spiritual outlook and social life

Perhaps. the speed with which this society evolved towards a materialistic civilization was too rapid to allow crystallization into a well-defined religion of the spiritual tenets inherited from the nascent culture of the Kot Dijian period. The religious mores of the society. as gathered from the motifs on painted pottery and as seen in the sculptural art, indicate a far more widely diffused heathenism than that encountered in the contemporary civilizations of Mesopotamia and Egypt. There is overwhelming evidence of a fertility cult and of superstitious preoccupation with various spirits of Heaven and Earth.

The cult objects show little change from Kot Dijian elements. and include the motif of *peepal* leaves (Sanskrit *asvattha* or *niagrodha. ficus religiosa).* fishes and fish-scale patterns. swastikas. hatched circles. rhombs. wavy lines. and other geometrical patterns. a large variety of 'mother goddesses'. phallic symbolism, tree spirits. and a homed deity recognized as 'proto-Siva'. On the whole. these features suggest affinity with an early stratum of spiritual outlook which is an animistic belief of a hunting and gathering society. Traces of animal motifs. such as ibexes and goats painted in a stylized way. indicate prehistoric social contacts with western and central Asia through the widely scattered village cultures of Baluchistan, while some art motifs, such as trefoil patterns, are suggestive of earlier social contacts with the classical Sumerian period of Akkadian times.

The ruins of the Indus Valley Civilization are singularly lacking in monumental temples. unlike those of Mesopotamia and Egypt. The priestly liturgies and shamanistic rituals can certainly be inferred on public occasions and on important events in individual lives. The public festivals may have corresponded with seasonal changes, characteristic of a peasant society and, therefore.

there must have existed some kind of primitive calendar based upon observations of heliacal risings and settings of certain constellations. aided by a count of the lunar phases.

The priest was probably recognized as both the spiritual minister and the temporal authority. commanding the reverence of the people. and enjoying certain privileges. But the architectural remains in the ruins of the Indus Valley Civilization do not show any great difference of class in the sizes and layout of residential houses of the rich and the poor. the rulers and the ruled.

Town planning

The poorer dwellings on the outskirts of the thickly built areas of Harappa and Moenjodaro have been distinguished as ‘workmen’s quarters’. They may be so. as suggested by their uniformity of plan. and the cramped spaces allotted to them. But this may be interpreted as a viably economic solution of the housing problems arising out of the flux of the working population towards large cities where urban land would have become substantially more costly than in the rest of the countryside. On the whole, the cities in the Indus Valley Civilization present from the social viewpoint the picture of a fairly egalitarian society.

A remarkable feature of the large urban settlements of the Indus Valley Civilization is the regularity and order in the town planning and consideration given to the civic amenities. the sewerage system and drainage. The main streets of the cities at both Harappa and Moenjodaro are generally oriented from north to south, with connecting streets running east to west, and thus dividing the cities into large rectangular or square blocks on a gridiron pattern. The main street running across the length of the lower city at Moenjodaro from north to south is a little over 9 metres in width while the others measure 2 to 5 metres. The subsidiary lanes leading to the interior of the city blocks are much narrower, allowing not more than two people to walk side by side. The subsidiary lanes are generally ‘dog-footed’. i.e. going straight for some distance in one direction, turning left or right round the comer of some building. turning again in the previous direction and ending up at some door front.

Great care was taken in shaping the drainage within the built-up areas of cities. The water-discharge sluices from houses first collected the dirt and refuse in small cesspits lined with bricks at the base of the walls. from which the dirty water was led

through conduits to the main drains running through the middle of the streets below pavement level and covered with flat stones and sturdy tile bricks. The system of covered drains was connected to the larger sewerage outlets. also covered at the top. which finally led the dirty water outside the populated areas.

The average house in these ancient cities appears to have stood at least two storeys high. as suggested by the thickness of the enclosing wall and by remnants of wide staircases where the steps and risers still survive to considerable height from the occupation level on the ground floor. The houses were built on plinths rising above the street level. with flights of steps recessed in the wall at the front door. The doors of the houses usually opened on to the side lanes rather than on to the main streets, which might have been considerably busy in the waking hours of the crowded cities.

The general plan of the residential houses suggests a square or a slightly oblong courtyard open to the sky. and surrounded by rooms and chambers. The entrance door normally led to an ante-chamber with passages towards the kitchen, pantry and living-rooms. The rooms and parlours usually had one or two windows placed high above the floor, and covered by alabaster lattice to keep out the excess glare of the scorching sun during summer.

The roofs of the houses appear to have been flat. supported upon a framework of wooden beams and purlins, covered with terracotta brick tiles, and made waterproof by rammed earth and a further plaster of impervious clay. Though the timber work could not survive the ravages of white ants, terracotta brick tiles from the debris of the collapsed roofs and terracotta conduits for letting the rain-water out from the roof tops have been found in sufficient number.

Most of the residential houses had their own wells in the court-yards for drawing water, There also seem to have been public wells near open squares for the benefit of those whose houses lacked this amenity. The wells were all lined with brickwork, and had protective revetments at their mouths to prevent children and domestic animals from falling into them.

In brief. the architectural features of these vestiges suggest something profoundly human-a love of comfort and collective welfare. The dilapidated townships of the Indus Valley Civilization might almost be the prototypes of modern and scientific town planning and. therefore. are of immense interest to students of architecture and urban geography.

Arts and crafts

Further insight into the skill of the people is provided by the movable cultural material and small finds from excavations. This cultural assemblage comprises a wide range of utilitarian, recreational. artistic and cult objects made of baked clay. lapidary. metals. ivory, conch shell, faience and other substances. Their handiwork in more vulnerable organic substances has not survived. and we are left to guess what kind of furniture they used, or what varieties of textile patterns they liked. The indications of the dyer's workshop in the remains of Moenjodaro. and certain patterns depicted on dresses worn by sculptured figures do, however, suggest that they liked colourful clothing. often embroidered or printed.

A whole spectrum of pottery types. mostly wheel-turned, presents a multitude of forms, sizes and decorative features. From simple bowls or vessels to slim vases and elaborate dishes-on-stand (frukrovnitsa), the potter's art seems to have surpassed that of the mason's. Dimensions vary from miniature containers for cosmetics to large troughs for washing clothes and feeding cattle. There are also perforated vessels used perhaps as sieves or incense burners. and loaf-shaped hollow boxes definitely used as mousetraps.

Specialists in ceramic studies are of the opinion that the shapes of many pottery features, such as bases. necks and rims, go back to Kot Dijian times. The modes of pottery decoration are smooth or matt surfaces. often polished with red or cream slip. Pottery painted with black or brown tints is characterized by geometrical designs. blended with vegetation, animals, birds and human forms. Their exuberance and richness bear the stamp of a naturalistic style. The chequered patterns and wavy lines suggest cultivated fields and flowing water, while plant motifs, ears of corn. birds. fish. stylized figures of homed animals, and the sun symbols bespeak of an obvious delight in the bounties of nature.

The use of baked clay was not limited to making pottery, as we find other terracotta objects. including a profusion of female figurines. a rich variety of toys and recreational paraphernalia. and other useful items. such as sling balls and terracotta cakes for toilet use. The female figurines with prominent busts are usually bejewelled. and are shown wearing a peculiar kind of head-dress. Their number suggests that they were cult objects. probably associated with the fertility cult. and as such, they are commonly called ‘mother goddesses’ in archaeological literature.

Terracota toys include miniature bulls with movable heads. carts with tiny solid wheels drawn by a pair of bullocks. such as we still find in reality with slight change in the design of wheels trundling along the dusty tracks in the countryside around Moenjodaro. Other amusing toys are whistling birds. monkeys. broods of chicken. and pet dogs. A glimpse of contented domestic life is reflected in the relics of indoor games. the bagatelle and a primitive kind of chess-board designed on brick tiles. with gamesmen made of agate or ivory.

It appears that in an area of extensive alluvial plains. where stones are difficult to find and costly to transport. most of their functions were taken over by baked clay. Thus, for instance. terracotta sling balls were used by the Harappan people to keep the wild animals at bay or flocks of voracious birds away from the cornfields. A vast quantity of terracotta cakes suggests not only their use as toilet items. but also as props for household furniture. and as supports and fillers between the stacks of unbaked pottery put in the firing kilns.

Nevertheless. as the term ‘chalcolithic culture’ indicates-and to which the Indus Valley Civilization rightly belongs-the use of stone is evident in the range of their cutlery and other tools, Ribbon flakes. blade cores. serrated blades. and drill heads. all made of chert stone. are found in great quantity. Good sources of chert are either in the Kirthar hills or in the Sukkur and Rohri hills. Indeed the demand for chert tools in the Indus Valley Civilization and also in the preceding Kot Dijian culture led to a depredation of the interesting Palaeolithic industrial sites that existed in the Sukkur and Rohri hills from Pleistocene times.

Archaeological researches, recently published. indicate that a large percentage of chert tools used in the Mature Harappan culture are reworked specimens of the Middle and Upper Palaeolithic tools lying in the source areas of the Sukkur and Rohri hills. The Palaeolithic tools, much patinated in the hot and humid climate of an interglacial phase and sand-blasted in the arid climate of the last glacial phase. still lie strewn there. side by side with the re-

worked tools of the Neolithic and Chalcolithic periods. the latter wearing a fresher look

Besides using chert flakes as knives or scrappers, and chert cores for striking sparks to kindle fire, the people of the Indus Valley Civilization also used precious and semi-precious lapidary, mainly in jewellery. Agate, jasper, carnelian, chalcedony and lapis lazuli make a fair list. An important centre for making carnelian and other beads seems to have been at the town of Chanhu-Daro in Sind. While some of the stones might have been of indigenous origin within the South-Asian Subcontinent, others might have been imported from far-off places. The nearest source of lapis lazuli, for instance, appears to have been in Badakhshan in the Pamir region of central Asia. Possibly there might have been some trade link with that region along the ancient route. following the upper Indus Valley. and across the Karakoram mountains.

The acquaintance of the people of the Indus Valley Civilization with metals seems to have been limited to copper, gold and silver. Copper smelting furnaces occur in quite a large number near the sites of Harappan culture. the latest known being at Balakot in Las Bela District. and those surveyed in the Hakra Valley in the Cholistan deserts of Bahawalpur. The nearest sources of copper are outside the Indus alluvium plain in the Rajputana region of India or in Chagai District of Pakistani Baluchistan. The copper furnaces show a profusion of slag material scattered around.

The copper objects comprise various utensils and cooking vessels, broad flat axes with rounded edges but without shaft holes, spear heads, knives, mirrors, pins with looped heads. needles. rings. beads and fish hooks. At least two female statuettes cast in copper are well known. one being the famous *Dancing Girl* found from excavations at Moenjodaro. Numerous oblong copper tablets with the peculiar Indus script and pictures of animals also occur.

Instances of silver and gold used in jewellery as beads and spacers are also common. These precious metals were obtained either by 'panning' the gravel and sand from beds of rivers as they emerged from high mountains or by trading overland from distant sources such as peninsular India or the Ural Mountains. Extraction of gold from the sands of the Indus is. however, attested by the accounts of Herodotus, Megasthenese and Pliny.

Inscribed seals

Other cultural items, such as combs, beads, rosettes and buttons made of ivory and the ladles and spoons made of conch shell, help in filling up the details of the people's daily life. But the most interesting objects in this distinctive culture are the steatite seals with enigmatic writings and portraits of various animals.

The Harappan seals, as these are generally known. appear in two conventional shapes. i.e. rectangular and square. The rectangular seals, exclusively bearing inscribed texts, are reported to have been found more numerous in the lower or earlier cultural deposits. Their sizes vary from 4 to 6 centimetres in length and about 1.3 centimetres in average breadth. The square seals, bearing inscriptions as well as miniature shapes of real and mythological animals or various kinds of deity in human form, were less frequent in the earlier levels. but increased in number in successive layers upwards. The square seals occur mostly in two standardized sizes. the majority measuring 2.3 cm^2. The larger square seals are 2.8 cm'. Unlike the rectangular steatite seals. the copper seals of the same shape noted earlier carry both inscriptions and animal figures. No square copper seals are in evidence so far. Only few instances of cylindrical seals of Sumerian convention are on record from excavations of the Indus Valley sites.

Some of the rectangular seals of copper and steatite appear to have been worn by the people as amulets, or as identity cards signifying some official position of the bearer. The square seals generally seem to have been used for stamping commodities passed through customs or taxation formalities or as hallmarks of business houses. Their reversed and embossed impressions have been noted on clay sealings, probably attached to cotton bales or spun yams, and even on certain pieces of terracotta pottery. In the latter cases. the seal impressions must obviously have been applied

before the wet clay had dried hard and been put in the firing kiln.

A correct determination of the purpose or purposes for which the various kinds of seal were used is a task of prime importance. It may explain in a more definite way the religious. social and intellectual organization and attainments of a vanished community-and even help in deciphering its strange script. Some of the generally accepted but hypothetical purposes delineated above have led the epigraphic experts in certain promising directions in their attempt to decipher the Indus Valley script. as we shall presently see.

Colour pages

1. Voices from the past are speaking in the pictographic script of these seals found at Moenjodaro.

2. The Mother Goddess, richly bejewelled.

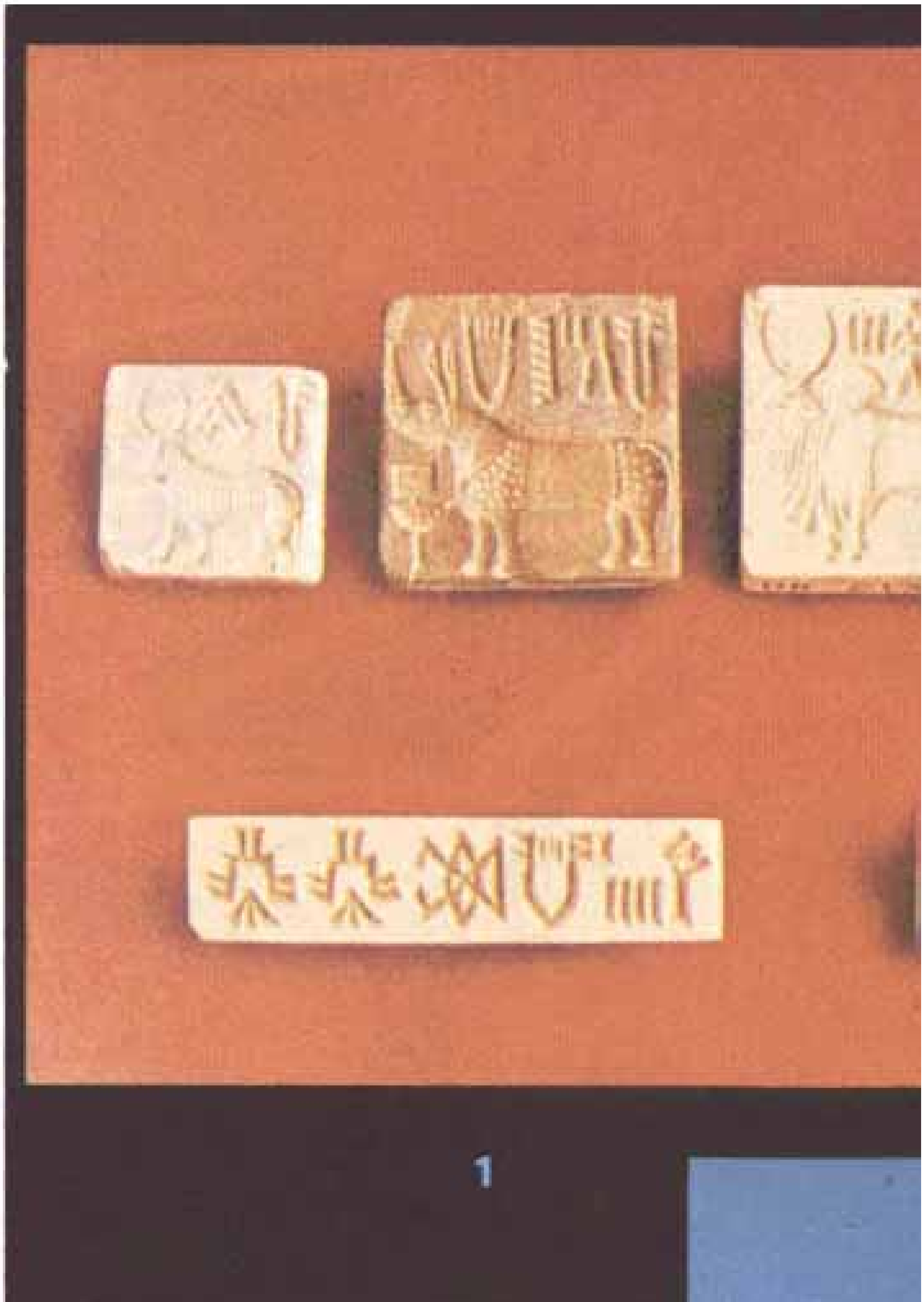
3. The Great Bath where Moenjodaro's elite probably gathered on religious occasions.

4. The King-Priest: his serene and powerful face tells of authority no less than his trefoil-patterned robe.

5. 6. Toy figures and a toy cart discovered at Moenjodaro.

7. Large stone weights and small measures of agate cubes used to ensure that customers received full measure.

8. A fascinating stalemate for the archaeologist-were these gamesmen used in the earliest form of chess?



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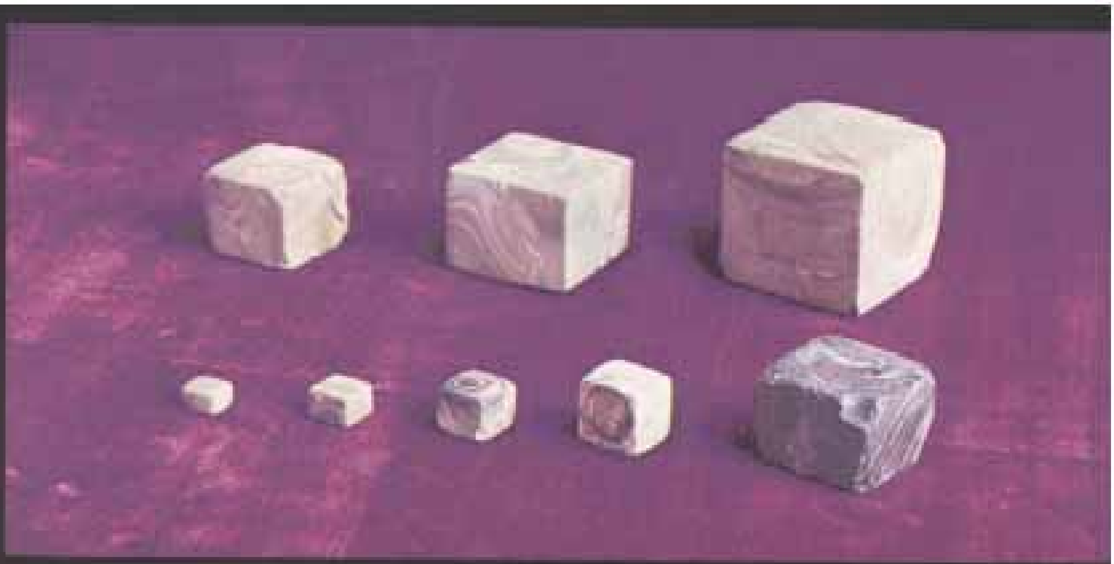
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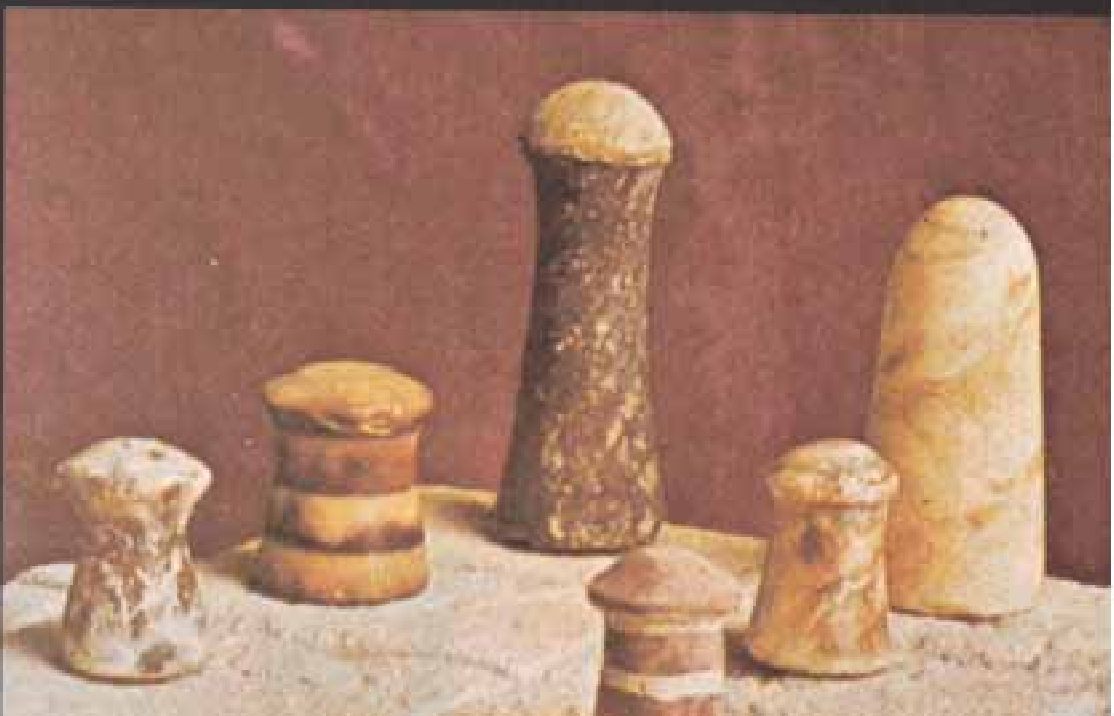
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Faience and steatite objects

Besides making stamp seals, the use of steatite extended to manufacturing beads and brooches for ornamental decorations. Steatite ground to powder and made into a paste with some adhesive solution is very useful in modelling small ornamental or decorative objects. It acquires a vitreous hardness on heating above 8OWC. and is known as faience. A large number of miniature birds. monkeys and squirrels modelled in faience have been found from excavations of the Indus Valley sites. As a medium of plastic art. therefore. faience is more sophisticated and durable than baked clay. A steatite object polished with abrasives and coated with alkaline substances also acquires a vitreous lustre on heating. Probably. because of the high cost of production. the use of steatite and faience remained limited to small *objets d'art.* such as ornaments. miniature animal models. and stamp seals.

At least in one case. steatite has been used for making a human bust. 18 cm in height. This is the celebrated '*King Priest* found in excavations of the Lower City of Moenjodaro. The title given to this piece of sculpture appears to be justified. as a steatite bust of an ordinary person is unlikely to have been made in this expensive medium.

It cannot be said with certainty that the sculptor who modelled the '*King Priest* actually succeeded in presenting a faithful portrait of the potentate. His half-shut contemplative eyes, low forehead. and densely grown but short cropped beard look rather stylized. The auricles of the ear, as they are very difficult to make. were simplified to concave hollows marked by oval rims. But the well-proportioned face and the roundness of the neck and shoulders indicate a rich man of some account.

The man's authoritative bearing is also reflected in his attire. A fillet tied round his forehead with a circular ring, and the same

kind of ornament used as an arm band on the right side, indicate some kind of dignitarian symbol. The flattened occupit at the back and slits made over the ears on both sides suggest that the personage originally wore some kind of headgear, made perhaps of gold or silver, which might have also been studded with precious stones.

Even more than the fillet and the arm band. his shawl wrapped diagonally across the chest. leaving the right shoulder bare. speaks of distinction. The trefoil pattern on this shawl, interspersed with occasional circles, has been compared with similar designs on a number of Mesopotamian cult objects of heavenly connotation. such as the Bull of Gudea, and many heavenly lions found on the boundary stones of the Babylonian empire. Such trefoil rosettes also decorate a pedestal for linga worship in the Harappan culture.

It would seem that the Harappan culture arising out of the parental Kot Dijian stock to solidify into the expansive Indus Valley Civilization. did not have much time to evolve an elaborate system of protocols. The functions of a spiritual and temporal guardian. presumably combined in the *King Priest*, were probably induced to some extent by the concept of heavenly pontification seen in the Sumerian civilization. This might have happened after the establishment of regular trade relations between the two regions, as discussed earlier.

The Moenjodaro *King Priest* did not adopt the wig and the long wavy and tapering beard of King Sargon I and his successors. and there is no evidence of the high Ziggurats raised to Marduk Enlil. Anu and Ea. However, an ecclesiastical symbol like the trefoil pattern of the Mesopotamians. which coincided with their own notion of the cosmological scheme, might well have been accepted by the people of the Harappan culture.

Whether we accept the steatite bust of the *King Priest* from Moenjodaro as representing the image of some *ipso facto* ruler, or reject it as just an object of art, it cannot be denied that whoever ruled over such a vast area knew how to assert his authority uniformly over the whole domain. This is already borne out by the regimentation of civic principles in the architectural design and town planning of the Indus Valley Civilization. But it is even more evident from the uniformity and regimentation seen in the weight measures for trading goods.

Weights and measures

Balance pans of small sizes made of terracotta. or of larger sizes made of copper, have been found in appreciable number at Moen-jodaro and other sites. The small weight measures of agate cubes carefully polished and the larger weights of marble or other stones made into elongate prisms of tri-lobe sections can be viewed in the repositories of the site museums. The order of ascension of the smaller weight measures appears to be binary. while that of the larger weight measures is decimal. with an intermediate range of fractional units in octad. and dodecanery. The binary ratio 16. weighing 13.625 grams, seems to have been the conventional unit of common use. Perhaps the weight measures used in the South-Asian Subcontinent till very recently before their displacement by the current decimal system were possibly connected with those of the Indus Valley Civilization.

The weight measure of any specific denomination at one place in the Indus Valley Civilization matched almost exactly with the same unit at any other place. There seems to have been an un-relenting vigil over the business ethics of giving full measure to customers-no possibility of cheating them by using spurious and deficient weights. This is. indeed. a feat of administrative catho-licity. of which there may be only few examples over such a vast area in the history of individual epochs of other civilizations. By inference. therefore. the Indus Valley possessed an efficient mech-anism of control. means of communication and transportation. and clerical staff to carry out the day-to-day administration.

Just as the Indus Valley Civilization was to a great extent the product of the substratum of the indigenous Kot Dijian culture. its process of growth cannot be viewed in total isolation from cultural developments in central and western Asia. A number of cultural items. like the internally segmented alabaster cups. point to its

intimate relations with the Chalcolithic communities at Susa and other Iranian sites.

All these features of its material culture, however. are only of academic interest. and the question of their origin in the native land or as exotic elements is beset with polemical arguments. A more definitive picture of the Indus Valley Civilization will have to await the deciphering of its script.

Indus Valley script

The Indus Valley writing is one of the most difficult undeciphered scripts of the world. So far no bilingual epigraphs are in evidence from anywhere within the region. or beyond its geographical borders. Unlike the Rosetta Stone. which unlocked the mystery of the Egyptian hieroglyphs. or the Behistun edict. which opened the flood gate of cuneiform literature in Assyriological researches, the tiny staccato messages of the Indus Valley epigraphs remain mute. inconvertible into human speech, remote, austere and challenging.

Despite the inscrutability of the script, the epigraphists and linguistic experts of the world have made many attempts at its decipherment during the last fifty years. The account of their efforts would make a long tale of trials and errors. Suffice it to say that the net positive gain of their researches so far has been recognition of nearly 350 different pictographs, and the fact, now nearly confirmed. that the script was written from right to left.

The pictographic elements of the Hindus script are remarkably close to the natural world of flora and fauna, with the addition of some geometrical shapes and material entities of an agrarian culture. There are. thus. simplified figures of fish. crabs. scorpions, fowls. birds. man. bifurcate boughs of pipal trees. thorny branches. segmented circles. squares. rectangles, rows of triangles like a range of serrated hills. upright arrows without feathery ends. sets of three parallel strokes. zigzag parallel lines as if indicating rivers, short vertical strokes. and long vertical strokes varying in number from one to twelve-the larger numbers mostly arranged in rows and columns. and a multitude of other utilitarian objects. such as combs, brooms and dumb-bells.

The pictorial features of the script suggest it to be at an elementary stage of evolution. but sufficiently standardized in its cultural milieu. Attempts to trace its origin to early cuneiform and

hieroglyphic scripts have failed, except for a general agreement among scholars to date its beginning in the same era of evolution as the agrarian societies in Mesopotamia and Egypt. In fact. a proto-Indus Valley script has been reported from the Kot Dijian levels at Rahman Dheri in the Bannu basin of the north-western province of Pakistan. Some graffiti symbols scratched on stray pot-sherds collected from the site have been tabulated to demonstrate convincingly that the Indus Valley script was not borrowed by the Mature Harappan culture from outside. but had its beginning in its own native setting of parental culture.

A significant difficulty presented by the Indus Valley script is that it has not been found in any long inscribed texts running, into several lines or paragraphs like the hieroglyphic and cuneiform texts. On any one Harappan seal, the number of pictographs hardly exceeds half a dozen. Despite this, a structural analysis of the contents has looked quite tempting to many scholars. who have tried to search for grammatical pauses. stops. inflections, marks of possessive and accusative cases, and so forth. Some of the small vertical strokes. and the oblique and horizontal ones may well be ligatures imparting different meanings or nuances to the same basic pictographs. while others may signify diacritical marks to particular lexemes and graphemes, according to the given usage of the unknown language. But as long as the language itself is not recognized with reasonable certainty, these hypothetical features amount to nothing more than building grammar in a vacuum.

The meaning conveyed by some of the pictographic symbols is tantalizingly within grasp. Unfortunately. we get no clue to their phonetic character and pronunciation. The vertical strokes standing singly or in rows suggest numerical values. but their limited maximum of twelve makes the case doubtful.

According to Father Henry Heras of Bombay. the vertical fish sign in the script means a star! In his researches he argues that the word ‘min’ is a homonym for both the fish and the star in most of the Dravidian languages now spoken in peninsular India. These languages are generally considered to be the offshoot of a more archaic parent language. proto-Dravidian, which was possibly spoken throughout the entire region of the Indus Valley Civilization from the middle of the third millennium to the beginning of the second millennium B.C. This fundamental concept in the evolution of the Dravidian languages as a basis for decipherment of the lndus script is favoured by the scholars of the Soviet Academy of Science. and even more by the scholars of the Scandinavian Institute for Asian Studies at Copenhagen. led by Dr Asko Parpola of the University of Helsinki.

Dr Asko Parpola and his associates have carried out studies for over ten years to prove that the language of the Indus Valley Civilization was proto-Dravidian. one of whose dialectical and much altered forms, the Brahui, is still spoken by a small tribal community living in central parts of Baluchistan.

This may or may not be so. especially as the proto-Dravidian origin of the Brahui language has recently been challenged by certain linguists. But the encouraging factor emerging out of the studies of the Scandinavian scholars is an intensification of the efforts to decipher the Indus Valley script by using computer techniques. This has resulted over the last few years in lists of thousands of Harappan seals distributed in hundreds of museums all over the world. besides those in the museums of the South-Asian Subcontinent and their archaeological depositories. The listing of seals lying in little known collections. and those discovered in recent excavations of the various other Harappan sites. is still continuing. It is a painstaking task for which the Scandinavian scholars have enlisted the co-operation of many archaeologists from the region and its completion will take a long time. Perhaps too much faith is being put in the power of the computer finally to decode the script. But even so. it will be a positive achievement to know the facts and figures of all the available material.

A germinal development in Dr Parpola's attempt to decipher the Indus Valley script has been his frequent references to the possible association of some of the script characters with the primitive concept of planetary motions in the Indus Valley Civilization to keep track of time or to have an agricultural calendar for sowing and harvesting the various crops at different times of the year. In this context. he takes recourse to many terminologies of primitive astronomical nature current in the usage of the living Dravidian languages. He combines them with the traditional celestial lore of Vedic times. with the result that an integrated mosaic of an early notion of the astronomical phenomena starts to take shape.

Dr Parpola's underlying argument that the primitive concepts of the celestial motions held by the proto-Dravidian people of the Indus Valley Civilization were acquired gradually by a new race which occupied the western parts of the South-Asian Subcontinent corresponds fairly well with the observed archaeological facts of a dying Harappan culture being supplanted by an alien culture of the Jhukar and Jhangar type near Moenjodaro. and the Painted Greyware culture elsewhere.

Despite its obscurities and difficulties of verification, this fertile avenue of researches presents a challenge to the historians of science, and also offers some promise of solving the mysteries

which shroud many features of the history of primitive astronomy. For instance, one of the problems still debated by the historians of ancient astronomy is that of tracing the origin of the Old World pattern of constellations-and particularly of the Zodiacal constellations.

Dr Parpola’s surmise that some of the Indus Valley script characters might be associated with primitive astronomical or calendrical problems has led one of the authors of the present text to examine the question in broad detail in the light of the ancient Mesopotamian and Vedic science of primitive astronomy. The results of the publication. though naturally inconclusive at the present stage. do suggest that the Indus Valley Civilization was in possession of a fairly accurate luni-solar calendar. The figures of various real and mythological animals or deified human shapes were possibly the symbolic expressions of most of the zodiacal constellations encountered in the Vedic *nakshatra*. If this be so. the miniature pictures carved in relief on the square steatite seals and on the rectangular copper seals from the Harappan sites do appear to hold the key to the decipherment of the Indus Valley script.

In brief. the decipherment of the Indus Valley script appears to be difficult, but not impossible. It is certainly beyond the competence of archaeologists or linguists alone, unaided by the historians of science. In some ways. it poses the same problems as those encountered by scholars in the decipherment of the Minoan Linear B script of ancient Crete. The fact that Michael Ventris and John Chadwick were able to decipher the Linear B script owed much to the clear precepts of the purpose of writing formulated by Sir Arthur Evans-the main purpose being maintenance of the accounts of the king’s stables and armoury.

In the case of the Indus Valley script, the main purpose appears to be the indication of time-the date. the bright and the dark halves of the lunar months, positions of the various visible planets or heavenly deities in the constellations of the primitive lunar zodiac. planetary weekdays, and the year as a whole. The short texts of the pictographic inscriptions are obviously not precise enough to tell very long stories, unless we concede to them meanings more complicated than those of our modem mathematical symbols. They may at best tell the name of a person. the season and year of the harvest of an agricultural produce being exported. the year of pleasure or wrath of a heavenly deity, and similar events. They might well be the precursors of the long tradition of the Venus Tablets that assyriologists call ‘judicial astronomy’.

Moenjodaro, signpost of a civilization

These general observations upon the Indus Valley Civilization as a whole enable us to look at some of the salient features of the excavated structures of Moenjodaro with deeper understanding and empathy. The name of the site. spelt ‘Mohenjodaro’ in the official reports of its discovery in the early 1920s. and in the various publications by Sir John Marshall and his followers. had generally been agreed to mean the ‘Mound of the Dead’. As the word for the dead in Sindhi language is *‘moen’*. in 1960 the spelling was rectified to ‘Moenjodaro’. which is now officially adopted by Pakistan.

The change in the name of the site from *Mohenjodaro* to *Moenjodaro* has caused some heated discussion in scholarly debates. The opponents of the change express doubt whether the nomenclature originally ever meant the ‘Mound of the Dead’. They argue that giving this meaning to the name of the place infers a *prima facie* knowledge of the archaeological character of the mound as a place for burying the remains of a dead civilization before its actual systematic excavation. As the name existed from time immemorial. it could certainly have not meant the ‘Mound of the Dead’. but something else.

A more plausible explanation advanced is that the name means ‘the mound of the Mohana people’. Mohana is actually the name of a minority tribe of fishermen living in boats and spending their whole lives on the crafts floating over the River Indus in its stretch from Sukkur to Manchar Lake. They earn their livelihood by fishing. catching waterfowl in flood seasons. and as porters and ferrymen serving the small villages of the settled rural communities.

The Mohana boatmen speak the Sindhi vernacular of the rural areas. but they are said to have a number of peculiar words and some cultural traits which set them apart from the rest of the

rural population. A detailed ethnological study of the Mohana people is lacking. but it appears that they are a remnant community or ethnic group of a native population which must have been more numerous in the past.

The Mohana boatmen still hold an annual festival of traditional kind at a point on the river bank right opposite the site of Moenjodaro. It is held some time at the beginning of the flood season and is marked by boat racing, swimming long distances along the direction of the currents. singing. dancing and other revelries. This is. indeed. very suggestive of their ancestral customs associated with the history of Moenjodaro, which probably deserves the name of 'Mohana-jo-Daro'.

The name Mohana also has some affinity with Melluha. mentioned earlier, occurring in the Mesopotamian tablets with economics texts and used to refer to a country situated to the east from thence. which supplied a number of commercial items. It is quite possible that the ancestors of the present Mohanas were the daring sailors who used to venture out in their flat-bottomed sail boats laden with cotton bales and other products of the country, and voyaged across the Arabian Sea within sight of the Makran coast to such trading outposts as Balakot, Sokhta Koh. Sutkagendor. and further on to the isles of Bahrein and other landing places in Sumerian climes.

Like the solid-wheeled bullock carts still plied in the countryside around Moenjodaro. and pointed out as a living example of the continuity of traditions reflected in the terracotta toy carts in Harappan culture. the flat-bottomed sail crafts of the Mohana boatmen also resemble the pictures of boats seen on a few seals at Moenjodaro. A detailed ethnological study of this amphibious community. such as their traditional designs of wood carving to decorate the interiors of their house-boats, may reveal other resemblances with the sculptural art of the classic period of the Indus Valley Civilization. Even more productive may be a philological study of the odd words and phrases current in their dialect in order to trace the nature of their original language. getting thereby some clues to the decipherment of the Indus Valley script.

The excavated remains

Over 100 hectares of the archaeological remains excavated during Sir John Marshall's time make only about 10 per cent of the known extent of the buried ruins at Moenjodaro. The excavated parts are grouped into four main sectors, known as 'S.D.'. 'D.K.'. 'V.S.' and 'H.R.' areas-the abbreviations indicating the names of the principal excavators. Siddiqui. Dikshit, Vats and Hargreaves respectively. Of these. the first area exposes the buried structures in the north of the smaller but higher mound. popularly called the 'Stupa Mound'. while the other three reveal the thickly constructed parts of the larger but lower mound to the east. There is another small sector of excavations over the south of the Stupa Mound designated as 'L' area in the old published plans. which was excavated in 1936.

The Great Bath. The most celebrated architectural remain at Moenjodaro is the Great Bath situated in the S.D. area of the Stupa Mound. It is a beautifully laid-out rectangular pool constructed in brick. measuring 11.9 metres in length and 7 metres in breadth-the longitudinal axis oriented north-south. The pool, which is 1.9 metres deep, has flights of steps at the northern and southern ends. Originally it seems to have been surrounded by a pavilion and a row of adjacent chambers. The rectangular pool was kept open to the sky. It was supplied with water drawn from a double-ringed well situated outside the eastern wall of the enclosure. The water drawn up in buckets was let into a covered drain passing beneath the floor of the cloister. The pool must have been kept clean by draining off the stagnant water through another covered drain towards its south-western corner. The outlet drain with a corbelled arch can be traced to some length. It led the used water outside the built-up areas of the Stupa Mound towards the low ground.

A close inspection of the Great Bath reveals many features suggesting that extraordinary care was taken in its construction. For instance, the water pool had a floor of bricks set in gypsum to make it watertight. The masonry linings of the retaining wall had been provided with a packing of bitumen to prevent lateral seepage of water. The steps going down into the pool seem to have carried wooden batons to protect the edges, and also perhaps to prevent them from becoming slippery.

The cloistered area of the Great Bath originally appears to have had two entrances each on the northern and southern sides, and one opening on to the eastern side. The northern and southern entrances were symmetrically disposed on either side of the longitudinal axis. One of the southern entrances was later closed up by a brick wall. Outside the building towards the north. across a brick-paved lane. there is a double row of public toilets. with their entrances arranged in contraposed positions for the sake of privacy. This area of public convenience was probably a part of the establishment of the Great Bath.

From its architectural appearance. the whole complex of the Great Bath of Moenjodaro seems to have carried some ritualistic significance. It was most probably a place for social gatherings of the elite of the city on religious occasions. It would seem that the chief priest and some of his ministers performed the liturgies by descending into the water pool from either of the northern or southern steps. and wading across slowly to the other end. chanting hymns and prayers to the deities. The rest of the gathering standing in the surrounding pavilion might have joined them in offering ovations to the gods. The occasions calling for such prayers might have been the new-year celebrations after observing the heliacal rising of the Pleiades. the transit of some benevolent or ominous planet. lunar or solar eclipses. earth tremors, threatening floods. predictions of disastrous storms. visitations by locust swarms, pestilence and epidemics.

The Granary. A second interesting architectural feature on the Stupa Mound is the podium of the great Granary situated on the western flank From an analogy with a similar granary studied earlier in the excavations at Harappa. Sir Mortimer Wheeler was able to demonstrate its purpose as a State Treasury by reconstructing it in drawings to show its various functional parts. The podium of the building. made of solid brick square-shaped platforms separated by a gridiron of straight and narrow passages. is thought to have been covered by a floor of wooden boards, and probably the superstructure was also made of wood. This hypothesis is sup-

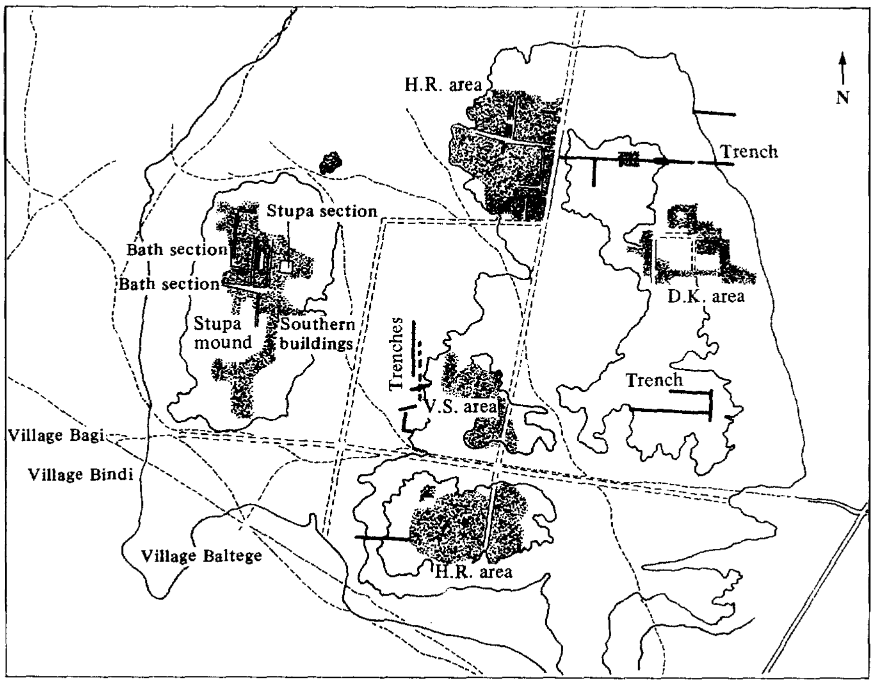
ported by observation of the narrow vertical grooves on the peripheral edges of the outer rows of the square platforms, indicating that they were meant for fixing vertical wooden beams to bear the load of the superstructure.

The gridiron of the straight narrow aisles in the podium. as argued by Sir Mortimer Wheeler. was made to provide air ducts which could keep the floor of the grain storage dry and safe from mildew. A quantity of charred grains of wheat collected from the excavations puts the nature of the building beyond any doubt. On its western side. there is also a brick-paved apron. approached from the lane below by a ramp. Wheeler suggests that this could have been the loading platform where bullock carts could be driven up to discharge their load of sacks of grain collected as tax from cultivators.

It is interesting to note that the use of this State Treasury continued for a long period during the heyday of Moenjodaro. but the building ultimately fell into disuse with the decline of the city. This is clearly suggested by the remains of shoddy masonry of a well dug close to the loading platform at a later period. which left no room for the bullock carts to operate, as seen in Wheeler's reconstruction.

The Pillared Hall. A third important building in the 'L' area of the Stupa Mound is known as the Pillared Hall. signifying its architectural layout or utilitarian function. The building. enclosing a small courtyard. probably carried a large roof supported on twenty pillars arranged in rows of five. It might have served as the court of the city magistrate or as a secretariat of the State.

One thing which clearly stands out from observation of these few important architectural remains on the Stupa Mound is that this part of ancient Moenjodaro in its prime was the chief administrative centre of the city, and probably also of the whole Indus Valley Civilization. From its elevated position above the flat countryside and the roof-tops of the Lower City sprawling on the eastern side. one can visualize the watchful gazes of the protectors of the law of the land. Any column of smoke rising from an accidental outbreak of fire. any shrieks by a victim of oppression. any riotous cries raised in the crowded city. any shouts of alarm of burglary or of wild beasts in the dead of night, or any suspicious straggler blundering unannounced into the sensitive heart of the domain would have put into motion the appropriate machinery of the State to deal with the situation.



Site plan of Moenjodaro.

Excavated remains of the Citadel area.

The Lower City. From the Stupa Mound to the Lower City is a short walk of a few hundred metres. Here. even in the limited portions laid bare by the archaeologists' spade. one is likely to get lost in the maize of lanes and by-lanes where the view is obstructed by, the high standing house walls. On the first visit to these ancient rums. it is better to be accompanied by a guide or equipped with a detailed plan of the city. It is rather Like walking through a fossilized embryo of a miniaturized Manhattan. This analogy has often tempted scholars to label its thoroughfares running from north to south as First Street or Second Street.

A contour plan of the mound of the Lower City of Moenjodaro looks like a magnificent tamarind tree. with its trunk going southwards. and the broad leafy canopy rising in bellowing masses towards north. The length of the canopy from north to south measures nearly 820 metres. its width at the base 720 metres. which tapers north to nearly 330 metres. The total area covered by this roughly trapezoid canopy is 5.62 times larger than that of the Stupa Mound.

Well shafts. sunk by later generations. used as measuring sticks of the depth to which Moenjodaro was buried.

Nestling in this canopy to the north are the excavated remains of the D.K. area in two parts. one on its eastern and the other on its western flank. The western flank of the mound remained a





preferred ground of investigations by the early excavators. as we see from the V.S. area in its lower middle and the H.R. area situated towards its base. The First Street of Moenjodaro. traceable almost straight through the length of the western flank of the Lower City. cuts across the H.R. and V.S. areas, and marks the eastern border of the thickly built D.K. area. The orientation of this arterial street makes an angle of almost 15°.

A bird's eye view of the excavated remains in the Lower City may give a misleading concept of the layout of the settlement at varying levels. unless one bears in mind the fact that these are not the remains of buildings erected in one period alone. Actually they are the cumulative result of nearly one thousand years of building. demolition. and rebuilding of the structures. The varying heights of the doors suggest at least seven different levels of occupation. though there may be substantially more, as the borehole sections show occupation floors situated 11.9 metres below the present surface levels.

A constant rise in the occupation levels at Moenjodaro is revealed by the chimney-like brick masonry of wells dug by later occupants of the city from the ground levels of their time. Such wells. especially notable in the D.K. area. are sunk deep down. in many cases cutting through the floors of the bed-chambers or kitchens of the earlier houses.

The process of building up the cultural mound at Moenjodaro has been assisted to a great extent by flood depositions by the River Indus. The average rate of thickening of the alluvial deposits in the lndus plains has been estimated at 18 cm per century. In many parts of the excavated sections, the cultural debris shows clear indications of water-borne sand and silt layers intervening between two successive occupation levels.

This brings out the hard fact that Moenjodaro in its lifetime weathered many storms and floods. emerging every time more resolutely determined to survive. But the war of attrition fought by its inhabitants against the forces of nature for some one thousand years finally took its toll. probably in one of the severest floods. when the civilization was already in the last phases of decline.

The end of Moenjodaro in a 'sea of mud' is an attractive theory. advanced by Robert L. Raikes and George F. Dales. which rivals Wheeler's theory of a wholesale massacre of its inhabitants by the murderous Aryan hordes. Perhaps both are partly right-the whole truth probably being a slow strangulation of the city by a combination of various natural forces and sociological factors.

Architectural features

The houses at Moenjodaro are built with bricks of nearly uniform dimensions, 27.94 cm in length. 13.42 cm in breadth, and 6.35 cm thick. The average weight of a single brick is such that one person can easily hold it up with one hand. This factor is indicative of the economy of the labour force employed in the construction of houses. The profusion of burnt bricks used in all constructions also indicates a broad-based commercial tradition of a brick-making industry. Some scholars have tried to build up an argument of radically different climatic conditions in the times when Moenjodaro was flourishing on the evidence of mass-scale production of burnt bricks. for it suggests plenty of firewood which in the present climatic conditions seems doubtful.

The designs and sizes of the houses indicate some variations in the social status of the owners. Some houses are larger than others with more suites of rooms and larger courtyards. The courtyards are normally placed towards the northern sides of the houses. The entrances lie through antechambers or rooms accessible from the narrower side lanes. In some cases, they are also opened in the courtyards bordered by a street. The outer walls of the houses are mostly plain and featureless. except where broken by the entrance doors or rubbish chutes.

Even a cursory glance at the layout of the different houses suggests that they were used for other purposes than residential. Some of the houses with larger courtyards probably served as industrial units for the potter's, carpenter's or wheelwright's trade. The dyer's shop in the H.R. area is a clear example of the commercial use of the built-up areas. Here we find rows of conical depressions. lined with rubbed bricks to provide secure bases for the dyer's vats.

The scientific value of the structured remains of Moenjodaro

in the study of Harappan culture lies in the fact that. whereas the archaeological remains of Harappa itself had been much disturbed and robbed of bricks by railway contractors before their proper excavation. the mounds of Moenjodaro were discovered in an almost undisturbed state. Unfortunately, the field techniques of archaeology in the early 1920s were not adequately developed to tackle the tremendous task with much deftness and precision. The method used for determining the relative ages of the structures. for instance. was by a comparison of their levels with a hypothetical datum calculated from the mean sea-level. The concept of stratigraphy as a more secure basis for determining the relative ages was not given due cognizance until Sir Mortimer Wheeler introduced it as a fundamental necessity in all archaeological studies.

The failure of the early excavators of Moenjodaro to record exact stratigraphic relations of the structural features. as well as the precise location and layers of the movable cultural material in the excavated areas, has raised many problems of interpretation and interrelationship between various objects and their cultural significance. Most of the interpretations seem to proceed from preconceived models of society in the Chalcolithic Age.

In order to obtain a fuller picture of the stratigraphic relations between the structures and the small finds, Sir Mortimer Wheeler started a limited excavation at some of the selected spots at Moenjodaro in 1950. His scheme failed, however. when he reached the saturation level of the groundwater table below which it became impossible to record stratigraphic layers.

A second attempt at salvaging the stratigraphy of Moenjodaro was made by Professor George F. Dales during 1964-65. when he laid an extensive trench on the western flank of the H.R. area of the Lower City. With a vast quantity of cultural material collected from the trench and the stratigraphic and borehole data recorded. Professor Dales is expected to publish his results in the near future.

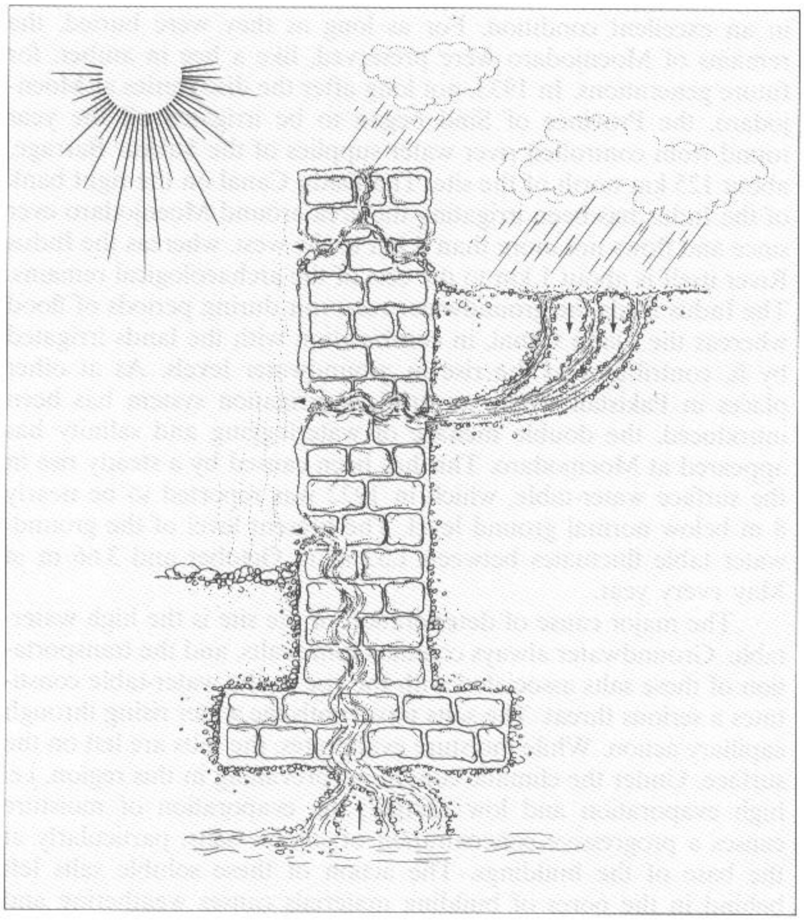
A very useful recent development in retrieving the finer details and planimetry of the early excavations at Moenjodaro has been initiated by Dr. Michael Jansen with financial grants frorn the University of Aachen (Federal Republic of Germany). With an invaluable collection of the photographic records of the early excavations at Moenjodaro obtained from the Archaeological Survey of British India. Dr Jansen has already started his painstaking work with a team of competent architectural draftsmen and other technicians stationed at the Campus of the Moenjodaro Museum.

Causes of deterioration of Moenjodaro

At the time of the excavations in 1922 the structural remains were in an excellent condition. For as long as they were buried. the remains of Moenjodaro were preserved. like a bee in amber. for future generations. In 1933. not long after the discoveries at Moenjodaro. the Province of Sind began to be irrigated all the year round from controlled river water supplies of the Sukkur Barrage. about 125 km north of the site. The Dadu Canal on the right bank of the Indus has been irrigating the area around Moenjodaro ever since and flows not more than 4 km to the west. whereas the Indus River itself is about 1 km to the east of the archaeological remains. The Indus feeds the groundwater reservoir during periods of flood whereas the Dadu Canal, in combination with the lands irrigated by it. contributes to the rise in groundwater levels. As at other places in Pakistan where an artificial irrigation system has been introduced. the double menace of waterlogging and salinity has appeared at Moenjodaro. This has been caused by a steady rise in the surface water-table. which in 1922 was reported to be nearly 8 m below normal ground level. The present level of the groundwater table fluctuates between 1.52 m in October and 3.66 m in May every year.

The major cause of deterioration of the site is the high water-table. Groundwater always contains some salts. and the transportation of these salts associated with the rise in the water-table constitutes a serious threat. The salts travel with the water rising through capillary action. While moisture evaporates, the salts are left on the surface. Under the climatic conditions prevailing in this region. i.e. high evaporation and low rainfall. the evaporation of moisture causes a progressive concentration of soluble salts. particularly at the base of the buildings. The action of these soluble salts left behind in the pores of building materials causes weathering and

disintegration of the materials. Both physio-chemical and physical processes play their role in this disintegration. The chemical action between the salts and the building material leads to weakening of the material. In the process. heavy pressures are exerted on the sides of the pores which break up the surface of the bricks. A continuous cycle of saturation. evaporation and crystallization is created, causing the brick masonry to exfoliate and crumble into dust. Over the past thirty years the twin menace of water-logging and salinity has reached alarming proportions. and today threatens the very existence of the remains of this remarkable civilization. The alarming pace of the deterioration was dramatically expressed by Dr H. J. Plenderleith who came to Pakistan in 1964 as bead of a Unesco mission. His assessment was: ‘If nothing is done to preserve it. all the existing excavations will crumble within the next 20



Movement of salts in the ruins.

Movement of salts in the ruins.



Laid bare virtually intact. these walls are crumbline under the pressure of salts crystallizing from the moisture which has seeped into them.

or 30 years and one of the most striking monuments of the dawn of civilization will be lost for ever.'

Coupled with the menace of the rising water-table is the less persistent but more erratic behaviour of the River Indus in the vicinity of Moenjodaro. It threatens to wash it away in one of those disastrous floods that are common in this monsoon land. The ravages of this mighty river. caused by its ever shifting course. are well known from time immemorial. Even the destruction of Moenjodaro has been attributed to it by certain archaeologists.

The Government of Pakistan has tackled the problem of salt encrustations on the structural remains with constant vigilance but limited success. This complex problem required not only huge finances which were beyond the resources of the Government of Pakistan but also technical know-bow of a multi-disciplinary nature. In 1960. the Government of Pakistan entered into negotiations with Unesco. and as a result a number of individual experts and missions of experts visited Pakistan to study the situation and suggest remedial measures. The first Unesco mission of experts. headed by Dr H. J. Plenderleith and with Theodore de Beaufort and Dr C. Voute as members. visited Moenjodaro in January 1964. This was followed by the visit of Professor S. J. Van Kregten in June 1966. and L. C. Krepel in 1966 and 1967. A few eminent archaeologists. including Sir Mortimer Wheeler. Professor K. Michalowski. Professor J. O. Brew and Professor C. Schaeffer were invited in 1968 with the assistance of Unesco to undertake a study of the danger facing Moenjodaro.

The views expressed by the members of these missions were as follows :

Sir Mortimer Wheeler (United Kingdom). It is important to save the remains of Moenjodaro for two reasons. First, it is one of the earliest cities of the world known to us at present. It is important to preserve it for future examination by scientists and archaeologists who can tell us more and more about the city from the relics left behind. Secondly. Moenjodaro is important as a great document in the pre-history of Pakistan. It is vital that these remains should be available for a very long time to come so that the coming generation of Pakistanis can see something of the previous achievements of their ancestors. He further remarked that the coming generation could find instruction and entertainment in seeing something of the problems and successes. perhaps even the failures. of those who built civilization first in this great land.

K. Michalowski (Poland). Moenjodaro must be saved from destruction in an international way like Nubia in Egypt.

Dr Claude Schaefer (France). No archaeological problem can be solved without reference to the Indus Valley Civilization. For us. dealing with Mediterranean and Near East archaeology, Moenjodaro is the eastern-most horizon. The problem of Moenjodaro is not the problem of Pakistan alone. but of the whole world.

Professor J. O. Brew (United States of America). All my life I have been studying the pre-history of the world and I found Moenjodaro a great archaeological site. No archaeological site of such dimension can be found in any other part of the world.

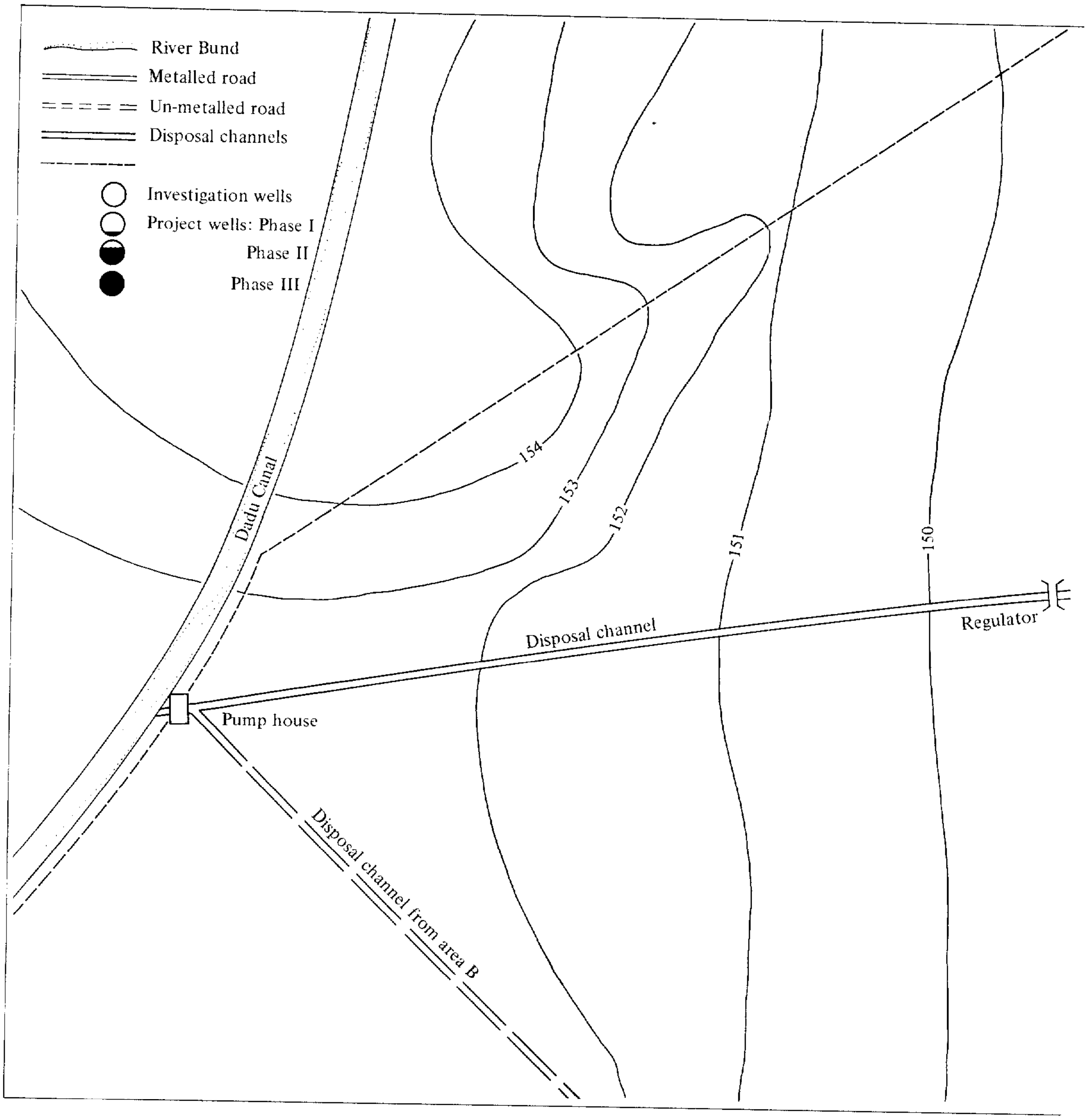
Finally. a Unesco mission of experts comprising Dr Zaky Iskander. Raoul Curiel and S. J. Van Kregten visited Moenjodaro in 1972. This mission along with experts from Pakistan, after further study of the problem and taking account of the observations and suggestions made by earlier missions. prepared a comprehensive Master Plan for the preservation of Moenjodaro. The Plan proposes dealing with the problem in three directions. namely: groundwater control; protection against the River Indus and conservation of the structural remains. The cost of the first phase of this programme was estimated at $7.5 million in 1972, but due to price escalation and certain other changes made at the recommendation of the International Consultative Committee, it now stands at $11.67 million.

Master plan for the preservation of Moenjodaro

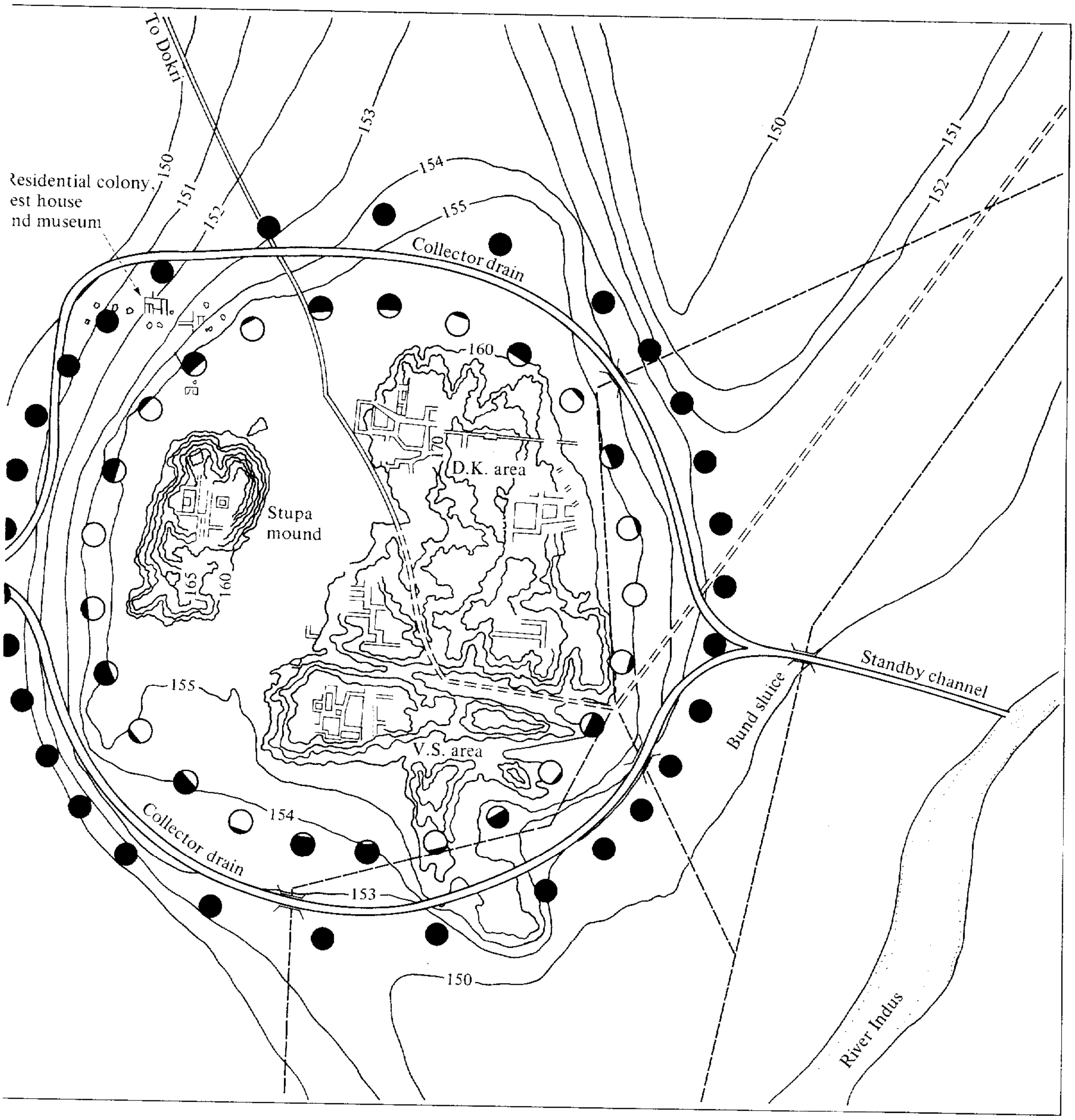
The salient features of the various schemes are as follows:

Groundwater control

The deterioration caused by salinization and waterlogging can be arrested only by lowering the water-table, which is also considered necessary from yet another angle. The origin of the Indus Civilization remains obscure in spite of the determined efforts of archaeologists. In 1950 an attempt was made to reach the lowest occupational level but it was not possible because of sub-soil water oozing from the trenches. Further lowering of the water-table will enable the archaeologists to venture deeper and unearth an older settlement which is confirmed by the fact that the boreholes drilled in 1960 encountered pottery at a depth of about 18 metres below the existing ground level. Groundwater recharge sources in this area-the Indus River and the Dadu Canal-are quite substantial. making lowering of the water-table a serious problem. In 1962. the firm Sir Macdonald and Partners produced an interim report suggesting the use of tube-wells for lowering the water-table. In 1966. the firm NEDECO. commissioned by Unesco. recommended deep drains to achieve the objective. The latter scheme was, however. rejected by the Unesco mission headed by Sir Mortimer Wheeler which came to Pakistan in 1968. It suggested the use of tube-wells for lowering the water-table. According to the plan prepared by the Water and Power Development Authority of Pakistan the lowering of the water-table will be done in three stages in Area A. In the first stage it is proposed to install a ring of fourteen wells to lower the water-table to 6 metres below ground level. These wells will operate at 71 per cent annual operation factor. Twelve addi-



River Bund
Metalled road
Un-metalled road
Disposal channels
Investigation wells
Project wells: Phase I
Phase II
Phase III
Dadu Canal
154
153
152
151
150
Disposal channel
Regulator
Pump house
Disposal channel from area B



Project layout: groundwater control will be achieved by installing rings of - tube-wells round the site.

tional wells will be installed in the same circle during the second stage. This will result in a lowering of the water-table to 9.75 metres below ground level. In this phase the wells will operate at 74 per cent operation factor. Eventually, in the third stage, thirty additional wells will be installed in a second ring, 244 metres away from the first circle. The water-table can then be maintained at about 20 metres below ground level by operating all fifty-six wells at 74 per cent operation factor. The de-watering in Area B is outside the scope of the present scheme.

The lowering of the water-table would not only benefit the world-famous remains of Moenjodaro. but would also promote the economic development of the area. An average of 123 cusecs of water pumped from the wells would help to cultivate intensively an area of about 6,000 hectares. Rough estimates of cost and production indicate that the net income of the farmers of this area would increase by thirteen times and gross production by eight times. In addition to its promotion of the Moenjodaro area as a model of agricultural development. the indirect investment in irrigation would also result in extra revenues for the government. which could be used to underwrite a major share of the operational costs of the proposed tube-wells.

Conservation of structural remains

Even after the root cause threatening the existence of Moenjodaro has been removed by groundwater control as maintained earlier. it would still be essential to take further measures for the proper conservation of the structural remains. The problem has been studied carefully by experts from Unesco and Pakistan and the following conservation measures, which are both preservative and protective in nature. have been recommended:

Underpinning of undermined walls. A large number of walls at the site have been undermined by the effects of salts and are hanging precariously. Such structures must be treated immediately by underpinning the overhanging portions. By this method the decomposed. disintegrated and crumbling portions of the walls will be replaced by new ones in the original style using original bricks where possible. If a wall has completely disappeared, it will be rebuilt so that the original layout plan is restored. In doing so. it will be ensured that no change takes place in the appearance of the site.

Damp-proof course. The salts which attack the brickwork are brought up from the sub-soil by moisture through capillary action. If this rise of moisture is stopped. the transfer of salt will also be stopped. In order to protect the structures from the capillary action that draws water and salts. it is essential to provide damp-proof courses. This will be done with precast concrete slabs of suitable size coated with bitumen on the unexposed surfaces, which are inserted into the masonry. The joints will be filled with bitumen under pressure. The exposed surfaces of the concrete members will be treated with pulverized brick and provided with artificial vertical joints. This method has been tried in the past and has proved quite useful.

Mud plaster. Salt-free mud will be plastered on the outside faces of the walls to afford some protection of the brickwork The salt collecting on the surface crystallizes in the plaster causing this to disintegrate instead of the brickwork.

Mud-capping. Although the annual rate of rainfall at Moenjodaro is low. its intensity is very high. The rain-water absorbed by the top surfaces of walls travels downwards into the core and comes out at a lower level bringing with it mud mortar from the core and from the joints of the masonry. However. if one or two layers of mud-bricks are kept on the top surfaces of the walls. the rain-water dissolves these mud-bricks and the thick mud slurry which flows downwards not only replenishes the weathered. decomposed and salt-affected mud mortar. which has come out from the joints of the brickwork through the effects of wind and rain. but at the same time makes the tops of the walls watertight as well. Apart from this. the mud of the bricks dissolved in the rain-water leaves a thin film of slurry coating which protects the masonry of the walls from salts borne by wind. This process has proved very effective.

Removal of salt-laden earth. The salt-saturated soil within the rooms has a damaging effect on the walls which are in contact with it. It has been observed that where the salt content of the soil is low. the degree of decay is also low in comparison with soil with high salt content. Experiments were conducted in certain areas and salt-saturated soil was removed from the rooms and replaced by sweet-earth maintaining the original levels. It was observed that a layer of sand spread below the sweet-earth considerably blocked the re-entry of salts into upper layers. This measure has checked the action taking place at ground level where the walls are in

contact with the soil and has been very helpful in saving the brick masonry from the disastrous effects of the salts.

Brick-on-edge flooring. Like most of the wails. the brick-on-edge flooring. both ordinary as well as cut and dressed, has also become decayed and disintegrated. Moreover the floor. being at ground level, has suffered more from the disastrous effects of salinity than other structural remains. Even the floor of the Great Bath, which had a sealing layer of bitumen under it, was completely decomposed and had to be renovated.

Drainage. At the end of the excavations, all the rooms. streets and houses had been left at different levels with the result that the rain-water now accumulates in different depths inside these structures all over the sites until it is either absorbed into the ground or evaporated in the atmosphere. This has a highly damaging effect on the structures and weakens the very foundations of the buildings. In order to overcome the situation. it is necessary to: (a) maintain proper levels in all these rooms. houses and streets, so that the rain-water may flow easily out of the city area without any obstruction; and (b) provide a network of drainage pipes. sewers and channels to collect rain-water from the different levels and discharge it away from the sites into the river or other low-lying areas.

Removal of debris. The millions of tonnes of debris which were excavated while exploring the remains were not. unfortunately, disposed of away from the site but dumped adjacent to the excavated remains. This spoil earth is highly saturated with salts and as it is at an elevated level the rain-water flows down these dumps into the remains. carrying large quantities of salts that saturate the soil and attack the brickwork Apart from being a source of salt inflow. these debris dumps also obstruct the drainage of the site and prevent the rain-water from flowing away into low-lying areas. The dumps of debris are to be removed to a safer distance.

Protection against the River Indus

Moenjodaro is located on the right bank of the River Indus, which runs at a distance of about a kilometre from the eastern edge of the remains. During the last three decades or so. the river in front of Moenjodaro has been eroding its banks at varying rate at one or

the other place and has been moving closer and closer to the archaeological remains. The existing depressions in the north and south of the remains. though small. are stated to be old river courses, One of the probable reasons of destruction of this ancient city. according to experts. is the River Indus. The invaluable heritage of the ancient civilization has thus been under a constant threat of erosion from the meandering and mighty Indus. The front embankment at a distance of about 4 km downstream of the remains became eroded during the early 1960s. This added to the apprehension of both the experts and the public. To keep the current of the Indus at safe distance a scheme was prepared by Pakistani specialists in 1972. It proposes that the system of training the river for the protection of Moenjodaro should be on a permanent footing so that (a) it pins down the extreme limit of the current at an optimum safe distance from the right edge of the river: (b) it is subject to the least possible strain during its life span. so that its maintenance can be kept at a minimum: and (c) it does not create any erosion problem elsewhere.

The scheme suggested construction of a hockey-cum-sloping spur and a guide bank. It could not be implemented mainly due to financial constraints. Meanwhile the river conditions changed altogether during the high floods of 1973 and 1975. It was therefore considered necessary to have the scheme for training the river reframed to suit the changed river conditions. The revised scheme envisages the construction of seven short T-head spurs in the river reach between mile 16/5 to mile 22/5 of Larkana-Sehwan Bund.

Landscaping and plantation of salt-tolerant trees

Lately. it has been observed that wind-borne salts also constitute a source of destruction. The salts are brought by the prevailing winds or wind storms from adjoining areas. In order to provide protection from this potential threat. it is proposed to have landscaping of the site around the remains and to plant salt-resistant trees and grass. It is expected that this will reduce the drifting of salts and their carriage by winds and by contact with the atmosphere. The trees will be planted in belts around the remains. The species of trees and grass have been recommended by specialists in the field.

International symposium

The Director-General of Unesco, in his message to the international symposium. held in Pakistan in 1973. while recognizing the need for the preservation of Moenjodaro, remarked that these remains represented one of the greatest manifestations of the historical and cultural achievement of ancient man, and they belonged not only to Pakistan. but also to the entire world. He concluded his message by expressing his confidence that ‘if we work together, we can save Moenjodaro’.

H.I.H. Prince Takahito Mikasa of Japan. who was also a delegate to the symposium. in his address said:

> This is indeed the most precious heritage of all mankind and we do wish that it should be saved by all possible means, so that we may be able to pass it on to the next generation. I consider it the duty of all the participants in the Symposium to communicate to their own people what they have seen and discussed at Moenjodaro. It will help to mobihze world public opinion in order to preserve the relics of the great and most valuable Indus Valley Civilization.

The delegates to the symposium, in a unanimous resolution. stressed the significance of Moenjodaro and the gravity of the problem of its preservation in the following words:

> That the Director-General of Unesco be informed of the success of this widely attended Symposium. with the earnest and urgent hope that the Master Plan which the Symposium discussed and approved for the conservation of the site of Moenjodaro as an outstanding monument of mankind’s earlier aspiration and advance towards a mature civilization may be implemented as a project of high priority. worthy in every sense of the fullest international support. Moenjodaro is a memorial not merely of the State of Pakistan. which is now fully conscious of its responsibilities

as its custodian, but is a visual document of the initial progress of humanity towards an evolved civilization. It is indeed today the property of mankind.

Professor Van Lohuizon de-Leeuw, University of Amsterdam, in her address to the delegates of the Second Conference on South Asian Archaeology. held in 1973. drew their attention to the challenging task of the preservation of Moenjodaro in the following words :

The outstanding remains of Moenjodaro are in a state of utter disintegration and decay and are rapidly approaching the fate of total destruction. Moenjodaro. the city of the dead. is indeed rapidly decaying and approaching its own death.

The importance of Moenjodaro is thus universally accepted. To save the site from total destruction is also important for yet another reason. The origin of the Indus Valley Civilization is not yet known. In order to unfold this mystery. it is necessary. not only that the site be preserved but the water-table be reduced to make deep diggings possible. Only then can we know about the earlier occupational levels of Moenjodaro.

Appeal by the Director-General of Unesco



M. Amadou-Mahtar M'Bow. Director-General of Unesco and His Excellency Iqbal A. Akhund. Ambassador. Minister Extraordinary and Plenipotentiary. Permanent Delegate of Pakistan IO Unesco. signing the agreement between Unesco and the Government of Pakistan.

The General Conference of Unesco. by resolution 3.421 adopted at its seventeenth session. authorized the Director-General to mobilize international assistance for the preservation of Moenjodaro, which represented a culture that flourished in the Indus Valley 5.000 years ago and was notable for its advanced town planning. hydraulic works and community. The Director-General of Unesco launched an appeal on 11 January 1974 to the conscience of the world to raise $5 million. The total cost of the priority work. which would take five years to complete, was obviously beyond the resources of a developing country like Pakistan which had to meet so

many needs. however skilled its technicians and however determined its leaders. The Director-General of Unesco said:

By the generous provision of money, equipment and services, governments, public and private individuals will not merely be helping to save a precious record of man's past. they will also be demonstrating and strengthening that intellectual and moral solidarity on which true peace must be founded.

Moves to make the master plan a reality started soon after its approval by the General Conference. Unesco made available funds for equipment for two experimental tube-wells which were set up at the site. Unesco also provided equipment for a laboratory at Moenjodaro. a study course for the chemist in charge of it. a mission to Egypt by the Pakistani Director of the Project, so that he could profit from the experience of the campaign to save the monuments of Nubia. and an on-site course at Moenjodaro for conservators working on the remains. Simultaneously. the Government of Pakistan. pending execution of the master plan. prepared a scheme for short-term measures to arrest the further decay of the remains. In addition. access roads have been made, a hotel built and an airport constructed to bring the site within easy reach of tourists.

The agreement between Unesco and the Government of Pakistan was signed on 10 October 1979. It provides that Unesco, through voluntary contributions, will make an effort to raise a sum of $5 million for the project. The international community has so far contributed an amount of $1.2 million to the Trust Fund for Moenjodaro. Unesco has therefore again appealed to its Member States and Associate Members to support the project. which will ensure for the people of Pakistan and for the whole of mankind the preservation of one of the world's most important sites marking, the emergence of urban civilization from the preceding simple neolithic communities.